

WHAT IS CLAIMED IS:

- 1 1. A communications node, comprising:
2 a packet switched device that operates using Internet Protocol, wherein the
3 packet switched device manages communication resources; and
4 a circuit switched device that provides physical switching between a
5 plurality of ports based on one or more commands from the packet switched device..
1 2. The communications node of claim 1, wherein the circuit switch device
2 determines one or more commands to at least one of establish, maintain, restore and break
3 down one or more communications paths based either on a condition of a network or a
4 routing request.
1 3. The communications node of claim 1, wherein the communications
2 resources is at least one of the circuit switched device, another communications node, at
3 least one routing table, at least one cross connect mapping and at least one logical
4 connection between communication nodes.
1 4. The communications node of claim 1, wherein the circuit switched device
2 is at least one of an optical or electronic cross connect, a optical or electrical add drop
3 multiplexor, an optical or electronic frame forwarder, a gigabit Ethernet device, an
4 Asynchronous Transfer Mode device, a label switch forwarding device and a SONET
5 device.
1 5. The communications node of claim 1, wherein only the circuit switched
2 device passes a service data between the plurality of ports.
1 6. The communications node of claim 1, wherein the packet switched device
2 transfers a service data between the plurality of ports.
1 7. The communications node of claim 1, wherein the packet switched device
2 sends the one or more commands to at least one other communications node.
1 8. The communications node of claim 1, wherein the circuit switched device
2 can provide at least one error condition to the packet switched device, and the packet
3 switched device issues instructions to the circuit switched device to handle the at least
4 one error.
1 9. The communications node of claim 8, wherein the error condition is a
2 pattern of lost or corrupted data.

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1 10. The communications node of claim 8, wherein the packet switched device
2 sends either instructions or notifications to at least one other communications node to
3 handle the error.

1 11. The communications node of claim 1, wherein the packet switched device
2 sends signals to determine at least one error condition and issues instructions to the
3 circuit switched device to handle the at least one error.

Q 1 12. The communications node of claim ¹¹~~10~~, wherein the packet switched
2 device sends either instructions or notifications to at least one other communications node
3 to handle the error.

1 13. The communications node of claim 1, wherein the packet switched device
2 handles at least one of managing peer interfaces, managing external interfaces, managing
3 internal resources, managing faults, and managing internal faults at the network edge.

Q 1 double ¹⁴~~12~~ Patent 9/685,952 The communications node of claim ¹³~~12~~, wherein the packet switched
2 device uses at least one of interior or exterior protocols, Border Gateway Protocol, Open
3 Shortest Path First and Intermediate Systems-Intermediate Systems signals to discover a
4 network topology.

1 15. The communications node of claim 14, wherein the packet switched
2 device uses at least one of the network topology and a bandwidth in use in determining
3 the one or more commands.

1 16. The communications node of claim 15, wherein the packet switched
2 device sends at least one of the one or more commands to at least one other
3 communications node.

5 17. The communications node of claim 16, wherein the at least one of the one
or more commands is sent to the at least one other communications node using at least
one of signaling via IP packets, resource reservation protocol (RSVP) and Constraint
Based Routing-Label Distribution Protocol (CR-LDP).

18. A Network comprising:

At least one communication node of claim 1.

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1 19. A method for providing communication paths in an Internet Protocol
2 network environment, comprising:

determining, using a packet switched device, how to manage communications resources; and

providing physical switching using a circuit switched device between a plurality of ports based on the one or more commands.

20. The method of claim 19, wherein the managing of communications resources is determining one or more commands to at least one of establish, maintain, restore and breakdown one or more communication paths.

21. The method of claim 19, wherein the communications resources is at least one of the circuit switched device, another communications node, at least one routing table, at least one cross connect mapping, and at least one logical connection between communication nodes.

22. The method of claim 19, wherein the circuit switched device is at least one of an optical or electronic cross connect, a optical or electronic add drop multiplexor, an optical or electronic frame forwarder, a gigabit Ethernet device, an Asynchronous Transfer Mode device, a label switch forwarding device and a SONET device.

23. The method of claim 19, wherein only the circuit switched device passes a service data between the plurality of ports.

24. The method of claim 19, wherein the packet switched device transfers a service data between the plurality of ports.

25. The method of claim 19, wherein the packet switched device sends the one or more commands to at least one other communications node.

26. The method of claim 19, further comprising the steps of:
providing at least one error condition to the packet switched device; and
issuing instructions from the packet switched device to the circuit switched device to handle the at least one error.

27. The method of claim 26, wherein the issuing of instructions includes sending either instructions or notifications to at least one other communications node to handle the error.

28. The method of claim 19, further comprising the steps of:
 sending signals from the packet switched device to determine at least one error condition; and

issuing instructions to the circuit switched device to handle the at least one error.

29. The method of claim 28, wherein the error condition is a pattern of lost or corrupted data.

30. The method of claim 28, wherein the issuing of instructions includes sending either instructions or notifications to at least one other communications node to handle the error.

31. The method of claim 19, wherein the determining includes at least one of managing peer interfaces, managing external interfaces, managing internal resources, managing internal faults, managing faults at the network edge.

32. The method of claim 31, wherein the determining uses at least one of internal or external gateway protocols, Open Shortest Path First (OSPF), border gateway protocol and Intermediate Systems-Intermediate Systems (IS-IS) signals to discover a network topology.

33. The method of claim 32, wherein the determining step uses at least one of the network topology and a bandwidth in use in determining one or more commands.

34. The method of claim 33, wherein the packet switched device sends one or more commands to at least one other communications node.

35. The method of claim 34, wherein the at least one of the one or more commands is sent to the at least one other communications node using at least one of signaling via IP packets, Resource Reservation Protocol (RSVP) and Constraint Based Routing-Label-Distribution Protocol (CR-LDP).